WOODS HOLE GROUP

US Army Corps of Engineers
New England District

DRAFT

OU #3 FIELD SAMPLING PLAN
Task 3 Harbor Flux Study

New Bedford Harbor Superfund Site

Contract No. W912WJ-09-D-0001-0005

Prepared For:
United States Army Corp of Engineers
New England District
696 Virginia Road
Concord, MA 01742

Prepared By:
Woods Hole Group, Inc.
81 Technology Park Drive
East Falmouth, MA 02536

November 2009

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USACE CONTRACT NO. W912WJ-09-D-0001-0005-02

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Project Title	OU #3 Reconnaissance Field Sampling Plan Task 3 Harbor Flux Study – New Bedford Harbor Superfund Site, New Bedford, Massachusetts
ADCP Survey Vessel	***R/V Quest***
Organization	Woods Hole Group, Inc. (WHG)
WHG Task Manager	Robert Catalano, WHG
WHG Chief Scientist	Dr. Leonid Ivanov, WHG
Address	WHG, 81 Technology Park Dr., E. Falmouth, MA 02536
Telephone	508-540-8080
Cellular Phone (Field)	(508) 648-1487
Organization	USACE
USACE Project Manager	Mr. Robert Leitch
Address	696 Virginia Road, Concord MA 01742-2751
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1.0 BACKGROUND INFORMATION

The New Bedford Harbor Superfund Site (Site), located in Bristol County, Massachusetts, extends from the shallow northern reaches of the Acushnet river estuary south through the commercial harbor of New Bedford and into 17,000 adjacent acres of Buzzards Bay. See the *Statement of Work for RI/FS Report Field Work, Operable Unit No. 3 (OU3), New Bedford Harbor Superfund Site, New Bedford, MA, 14 August 2009* (SOW) for further information on site background and history. This Field Sampling Plan (FSP) describes the sub-set of the activities for Task 3 – Harbor Flux Study to be taken in Operable Unit III (OU#3) located at, inside, and outside of the hurricane barrier. The location of the OU#3, Task 3 Horizontal ADCP (Acoustic Doppler Current Profiler) site is shown in Figure 1.

Figure 1. New Bedford OU#3 Study Area

2.0 OU#3 TASK #3 HARBOR FLUX PURPOSE

The purpose of Task 3, Harbor Flux Study of OU#3 is to quantify the transport of PCBs through the hurricane barrier. The Harbor Flux Study will be performed in consecutive sub-tasks, as outlined below. Water current data to be collected in 2009 will be analyzed to select locations for water column sampling and analysis, planned for 2009/2010. The

observations and data obtained during this Harbor Flux Study will be incorporated into the overall Remedial Investigation and Feasibility Study for OU#3.

The Conceptual Site Model (CSM) and Data Gaps Analysis Report (WHG, 2009c) recognized that although there may be multiple potential ongoing sources of PCBs to OU#3, it is anticipated the primary ongoing source is from New Bedford Harbor via net flux of PCBs out through the hurricane barrier. Therefore, the exposures to representative species as defined in the CSM may largely be driven by this export. PCB flux may be either in aqueous phase or attached to sediments, primarily suspended fine sediments. The ongoing remediation of New Bedford Harbor is intended to substantially reduce the PCB contamination within the Harbor, which also has the intended effect of reducing the export of PCBs throughout the system over time, including into OU#3. Extensive ongoing studies and models by the EPA and USACE are being conducted to quantify the anticipated long-term, time-varying reduction in pollutant loading and health risk reduction (i.e., reduction of contaminant of concern (COC) concentrations in fish tissue and resultant health risk reduction).

These benefits are likely to be incremental, with the tissue concentration targets being achieved over a time period of a decade or more. The current export of PCBs from the Harbor to OU#3 poses a potential ecological risk (yet to be estimated). However, the estimates of the magnitude of this export are not well-constrained. The purpose of the Harbor Flux Study is to improve the estimates of present-day PCB flux from the Harbor to OU#3, and establish a methodology that could be repeated in the future, if required.

Comment [e1]: Correct word used here? Do you mean understood?

Comment [BB2]: I had the same suggestion

3.0 OU#3/TASK 3 HARBOR FLUX STUDY FIELD OBJECTIVES

Task 3 is intended to reduce the uncertainty associated with the estimates of potential influence of PCBs exported from the Harbor on risk within OU#3. The approach to quantifying this export of PCBs through the hurricane barrier includes a combination of:

- month-long (minimum) velocity measurements to capture the time variations of water flow
- short-term current measurements over six (6) tidal cycles to capture the spatial variations in flow through the barrier, and
- short-term water sampling and analysis over six (6) tidal cycles to measure the water- and sediment-borne PCB concentrations under various tidal and weather conditions.

Using these three data sets, estimates of the net export of PCBs through the hurricane barrier from the Harbor to OU#3 will be developed.

4.0 FIELD PERSONNEL

The field sampling and measurement program will be conducted by WHG personnel assisted by a diving sub-contractor, Diving Services, Inc. Work will be shore-based and vessel-based. Vessel-based work will be conducted from the aboard the R/V Quest, chartered from TG&B, Inc.

Field staff will include a minimum of three Woods Hole Group team staff, including the Boat Captain, Chief Scientist, and Task Manager or Field Engineer. The 2009 WHG team staff will include: Leonid Ivanov, Ph.D. (Chief Scientist), Robert A. Catalano (Task Manager), and David Bailey (Field Engineer). Sub-Contracting services will be for the diving work provided by Diving Services Inc, of Foster, RI. Diving Services Inc. is qualified to OSHA and USACE diving requirements and will be responsible for all underwater aspects of this task under the guidance of the WHG Task Manager. Vessels will be chartered from TG&B, Inc.

Contact Information:

Comment [e3]: Include USACE Dive Safety Coordinator – Richard Loyd?

Woods Hole Group Task Manager:
Robert A. Catalano: 508-495-6230 (work) or 508-648-1487 (cell)
Woods Hole Group Chief Scientist:
Dr. Leonid Ivanov: 508-495-6226 (work) or 774-521-7149 (cell)
EPA Remedial Project Manager (RPM):
Elaine Stanley, 617- 918-1332 (work)
USACE Project Manager:
Robert Leitch, 978-318-8033 (work) or 978-886-0540 (cell)

5.0 SEQUENCE OF SAMPLING TASK/EVENTS

The sequence of the Harbor Flux Study tasks for the 2009-2010 sampling is listed in Table 1 below.

Table 1. Sampling Tasks/Events for OU#3 Field Reconnaissance

Event	Estimated Project Schedule
Mobilization	November 2009
Sub-Task 1. Installation of HADCP	November 2009
Sub-Task 2. Perform Real Time ADCP surveys – Qty 2	November/December 2009
Sub-Task 3. Interim Service and Data Retrieval from HADCP	December 2009
Sub-Task 4. Data Analysis to Determine Water Column Sample locations	December 2009
Sub-Task 5. Conduct Water Column Sampling – Qty 6	December2009/January 2010
Sub-Task 6. Final Retrieval of HADCP	January 2010
Sub-Task 7. Data Analysis and Reporting	February 2010

6.0 OU#3 FLUX STUDY ACTIVITIES

Seven specific sub-tasks have been defined for OU#3/Task 3 Harbor Flux Study activities:

- Sub-Task 1 includes activities for field reconnaissance to confirm the installation process for the HADCP on the hurricane barrier structural elements and the installation itself. This will include documentation and submittal of the dive safety plan.

- Sub-Task 2 includes field activities to conduct two tidal cycle ADCP surveys to assess spatial variation in water velocities.
- Sub-Task 3 includes 15-day interim service and data recovery from the HADCP, re-deployment for the first 30-day velocity measurements, and data recovery after this initial 30-day velocity measurements acquisition.
- Sub-Task 4 includes analysis of the data from the first 30-day velocity measurements plus analysis of the two vessel ADCP surveys to define the sampling locations for the water column samples to be collected.
- Sub-Task 5 includes the 6 surface water column sampling events
- Sub-Task 6 is the recovery of the HADCP from the hurricane barrier
- Sub-Task 7 includes all the reporting requirements of this Harbor Flux Study

These activities are further described below.

6.1 SUB-TASK 1 INSTALLATION OF HADCP

The HADCP will be deployed for at least 15 days to provide reconnaissance velocity information to help guide the overall sampling program (i.e., where to sample the water column for flow-proportion compositing). Based on preliminary onsite reconnaissance and review of engineering drawings, a horizontal-looking ADCP (H-ADCP) will be installed on the hurricane barrier structure itself. The exact configuration of the temporary mounting system, anticipated to be diver-deployed, will be developed as part of the execution of this work. An internally recording Acoustic Doppler Current Profiler (ADCP) will be used to record current velocity.

Documentation and submittal of the dive safety plan will also be performed during this sub-task.

6.2 SUB-TASK 2 SHIPBOARD CURRENT MEASUREMENT SURVEYS

The shipboard surveys using ADCP technology will be conducted over 2 tidal cycles to capture spatial variations within the channel and near-vicinity and with depth. A pre-defined set of track lines will be repeated in vicinity of the harbor mouth approximately hourly over the course of the full tidal cycle for each survey (Figure 2). The shipboard data along with the HADCP data from Sub-Task 1 will be analyzed to select water column sampling locations (outlined below) for the chemistry sampling and analysis.

Figure 2. Planned ADCP Track lines

6.3 SUB-TASK 3 INTERIM SERVICE & DATA DOWNLOAD FROM HADCP

After a minimum of 15 days from the deployment date of Sub-Task 1, WHG personnel and sub-contracted dive team will recover the HADCP and download the data. A field data analysis will be made to verify that high quality data had been recorded during the deployment, battery capacity will be checked by the recovery team, data transferred to a PC and backed up onto a separate data storage medium, then the instrument data will be erased and the instrument returned to hurricane barrier.

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After re-deployment of the HADCP, measurements of current velocity will be initiated to quantify the flow of water through the hurricane barrier over a one-month (30 day) period. At the end of the 30-day period, WHG personnel and sub-contracted dive team will recover the HADCP and download the data for use in analysis in Sub-Task 4.

6.4 SUB-TASK 4 DATA ANALYSIS & WATER SAMPLE LOCATION DETERMINATION

Following the initial deployment of the HADCP installation and the completion of the two ship-based ADCP studies, the data will be analyzed to develop the optimal locations for the water column sampling. This will include the geographic location, sample

collection depths, and the sequence and timing of sample collection within the tidal cycle. Locations and times of sampling will be defined to provide a set of samples that can be used to derive a flow-proportioned estimate of PCB flux.

6.5 SUB-TASK 5 SURFACE WATER SAMPLING

Six (6) intensive surface water column sampling events are planned to adequately estimate the PCB flux through the hurricane barrier, including:

- Two (2) neap tides
- Two (2) spring tides
- Two (2) wet weather or storm conditions to be selected in close cooperation with USACE and EPA staff.

During each event, three (3) water samples will be collected over depth at three (3) locations across the channel approximately every 1.5 hours over a full tidal cycle. The exact locations for the samples will be determined based on the results of the Sub-Task 4 analysis. The vessel will navigate to each sampling station using GPS, and the captain will actively control the vessel to stay on-station during the sampling. Samples will be pumped onboard through a weighted tube lowered to the target depth. A discrete sample will be collected in a sample bottle, and will then be added to the compositing basin. There will be a compositing basin for flood tide samples, and a separate basin for ebb tide samples. Each individual sample added to the basin will have a consistent volume (e.g., 1 liter) so as not to bias the composite from a particular sample. Once all the samples for an ebb or flood tide are added to the basin, the basin will be mixed, and a single sample will be obtained for chemical analysis.

Assuming 9 samples for each of 9 events over a tidal cycle, a total of eighty-one (81) individual water samples will be collected during each tidal cycle. The samples representing ebb and flood flow will be combined into two separate composite samples from each survey for analytical chemistry. Therefore, a total of twelve (12) composite samples will be collected from the six (6) surveys for laboratory analysis (one flood and one ebb sample for each survey).

Comment [e4]: There will need to be a filtering step either here or in the lab so that dissolved and particulate PCB analysis can be run.. I assume this will take place in the lab?

Comment [BB5]: It is also not clear to me where the filtering step comes in. It appears that we are analyzing for total and dissolved and getting particulate by difference? It that is the plan, we have not been very successful with that approach.

6.5.1 Analytical Chemistry

For the 12 composite water samples specified above, Alpha Analytical Laboratory will analyze for total suspended solids (TSS), turbidity, and 209 PCB Congeners (Total and Dissolved) based on the USEPA methods defined in the OU#3 QAPP (WHG, 2009). Quality Control (QC) samples will also be collected to assess accuracy and precision of these composite water samples via one matrix spike and matrix spike duplicate set of QC samples for PCBs and one matrix duplicate sample for turbidity and for TSS. See QAPP Worksheets #12&28 combined, #15, #20, and #23 for further details on chemistry analyses, methods, project-required reporting limits, and other project QC requirements for these Flux study samples.

6.6 SUB-TASK 6 FINAL HADCP RECOVERY

Once the Surface Water Samples have been collected, the HADCP will be retrieved from the hurricane barrier. A dive plan will be submitted for dive operation for approval and concurrence with USACE hurricane barrier operations personnel before any diving activities will take place.

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6.7 SUB-TASK 7 Data Analysis

Data Analysis will be performed as detailed in the OU#3 Work Plan (WHG, to be developed). These data will provide information intended to be evaluated as part of the overall RI/FS for OU#3. Types of analysis expected to support the RI/FS are summarized below and will be refined through the RI/FS process.

- Velocity measurements will be analyzed to compute volumetric water flow exchanged/exported, including time variation and net volume of water exported from New Bedford Harbor to OU#3 over the measurement period (water flux). Specific calculations will be made for each individual ebb and flood tide during the measurement period, including the six (6) time periods when intensive water column sampling was conducted.
- Measured PCB concentration data will be scaled using estimated volumetric water exchange to approximate the net mass loading export of PCBs through the hurricane barrier into OU#3 for each of the six (6) surveys.
- Using new data combined with historical records of precipitation/freshwater runoff, attempt to extrapolate the PCB mass flux estimates for the six (6) surveys into a long-term average flux.
- To evaluate the relative mass loading of PCBs in OU#3 from harbor flux versus other sources, we will use available NPDES data related to flow rates and PCB concentrations for the CDE "groundwater well" and the City of New Bedford wastewater discharge to approximate the relative PCB mass loading from these potential ongoing sources to the flux through the hurricane barrier.

Comment [BB6]: I'm not sure that this is possible. Will they have this data in dissolved and particulate form with 209 congeners? If not, I'm not sure how you can compare them.

Data Reporting will be accomplished once all the laboratory analysis is completed and the geo-referenced sampling locations are plotted for inclusion to the Task 3 Harbor Flux Study Final Report. The report will have a brief narrative summarizing data collected, deviations from the FSP or QAPP, and problems and corrective actions taken for field and laboratory activities. The report will also summarize the analysis that was used to develop the surface water sampling plan, as well as the analysis that was used as the basis for the water and PCB flux estimates. A section on additional analysis recommended for the RI/FS will be provided, and an electronic copy of the validated data will be included in an Appendix on a CD.

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7.0 FIELD SAMPLING PROCEDURES

7.1 SAMPLE COLLECTION

Surface water samples will be collected as indicated in the SOP for collection of surface water samples included as Attachment 1 of this FSP.

Alpha Analytical will supply pre-cleaned containers for surface water chemistry for TSS, TOC and PCB congeners. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest U.S. EPA's *Specifications and Guidance for Contaminant-Free Sample Containers*. Certificates of analysis are provided with each bottle lot and maintained on file by Alpha Analytical to document conformance to EPA specifications.

A summary of sample container, preservation, and holding time requirements is presented below in Table 2.

Table 2. Sample Volumes, Containers, Preservation, and Holding Time for Surface Water Column Composite Samples

Matrix	Parameter	Sample Volume[1]	Sample Containers[1]	Field Preservation	Maximum Holding Time to Analysis
Surface Water	209 PCB Congeners - Total	2 L	2 x 1-L Amber Glass	Ice, 4°C ± 2°C	7 days to extraction; 40 days to analysis
Surface Water	209 PCB Congeners - Dissolved	2 L	2 x 1-L Amber Glass	Ice, 4°C ± 2°C, filter 0.45 µm at lab within 24-h of collection	7 days to extraction; 40 days to analysis
Surface Water	TSS	1 L	1 x 1-L Plastic	Ice, 4°C ± 2°C	7 days
Surface Water	TOC	10 mL	2 x 40-mL VOA vials	HCl: pH <2 Ice, 4°C ± 2°C	28 days

[1]These are volumes and containers are per sample per analysis. Additional aliquots may be collected for QC samples (e.g., MS/MSD or MD).

7.2 SAMPLE HANDLING AND CUSTODY

The following provides a brief discussion of sample handling and custody procedures. For details, please refer to Woods Hole Group QAPP (Woods Hole Group, 2009a – in progress). .

Samples will be placed in coolers with the appropriate documentation and picked-up daily by a currier for Alpha Analytical. Temperature of the cooler will be measured and recorded upon receipt at the laboratory. An example Chain-of-Custody (COC) form is included as Attachment 4.

Additional details regarding sample handling and custody include:

- Sample labels are hand written at the time of sample collection and are affixed to the individual samples. Chain–Of-Custody (COC) forms will be initiated in the field.
- Samples are in the custody of the survey Chief Scientist until relinquished to the laboratory.
- Custody forms will accompany the samples when transferred from the field to the laboratory.
- Each shipment will include the original, signed custody forms. Copies of the custody forms will be kept in the project files at WHG.
- When the samples arrive at each laboratory, custody is relinquished to the receiving Laboratory Sample Custodian. The Laboratory Sample Custodian must examine the samples, verify that the custody forms are accurate and that the samples are intact, log the samples into their laboratory tracking system and complete and sign the custody forms. To make the custody transfer complete. Any discrepancies between sample labels and custody forms and unusual events or deviations from the project QAPP will be documented in detail on the custody forms or laboratory sample receipt form
- Copies of the original custody forms along with the comments and signature of the receiving Laboratory Sample Custodian will be transferred to the WHG Task Manager within 48 hours of sample collection.

7.3 FIELD EQUIPMENT DECONTAMINATION

Decontamination is the process of neutralization, washing, and rinsing exposed outer surfaces of equipment to minimize the potential for contaminant migration and/or cross-contamination. This procedure does not apply to personnel decontamination that is described in the Accident Prevention Plan (APP) (Woods Hole Group 2009b – in progress). Decontamination of sampling equipment and field support equipment is required so that sampling cross-contamination is prevented, and on-site contaminants are not carried away from the site. Sampling equipment will be cleaned prior to use and between each station location. The water quality pumping system and the compositing basins will be decontaminated using the following procedure:

- Rinse with site sea water between each 1.5 hour sampling event;
- Rinse well with site sea water from the station to be sampled by allowing the first flush from each discrete sampling point to be disposed on the deck.
- Rinse compositing basins well with site sea water prior to sample collection at each location

7.4 ON-SITE FIELD MEASUREMENTS – WATER QUALITY

Field measurements of the water temperature, salinity, and dissolved oxygen (DO) concentration profile and secchi depth will be taken at one location for each 1.5 hour water quality sampling event. The location of these measurements will be at a safe point mid-channel after the samples are collected, approximately each 1.5 hours. All

measurements except secchi depth will be taken using a YSI 6920 data sonde with an optical DO sensor. The SOP for on-site field water quality measurements is provided as Attachment 5.

7.5 FIELD EQUIPMENT MAINTENANCE AND CALIBRATION

All equipment will be cleaned and decontaminated before leaving the field site. The GPS will be calibrated on a daily basis. In the event the GPS is faulty, a replacement GPS will be made available. The YSI used for water quality measurements will undergo equipment maintenance as defined by the manufacturer.

Field instruments will be calibrated according to the manufacturer's specifications. All calibration procedures performed will be documented in the field logbook and will include the date/time of calibration, name of person performing the calibration, reference standard used, temperature at which the readings were taken, and the readings. Attachment 2 includes the DGPS calibration form that will be used in the field. A summary of calibration procedures, frequency, and acceptance criteria is provided below in Table 3.

Table 3. Summary of Calibration Frequency and Criterion for Field Instruments

Parameter/ Instrument	Calibration Frequency	Calibration Standards	Acceptance Criteria
Salinity YSI 6920 or equivalent	Initial: Factory calibrated annually.	NA	NA
	Check: Prior to use in field and weekly at a minimum	Conductivity solution: 10,000 US	Instrument notification if value is out of range.
DO YSI 6920	Initial: Factory calibrated annually.	NA	NA
	Check: Prior to daily use in field	Calibration in air. Reference reading to 100% saturation.	Instrument notification if value is out of range.
Temperature YSI or equivalent	Initial: Factory calibrated annually.	NA	NA
	No field calibration required.	NA	NA
Station location DGPS	Daily check against surveyed benchmark before and after sampling	Check vs. boat dock location	± 10 ft

7.6 FIELD QA/QC

QC procedures for field measurements will include calibrations as described above in Table 3. QC measures for surface water sample collection will include the following the field sampling SOP, included as Attachment 1. In addition:

- The work will be performed by qualified personnel,
- Sampling equipment will be tested for functionality prior to use,
- Sampling equipment will be decontaminated prior to use, and
- Sample contamination will be avoided through procedural and engineering controls.

Field QC samples will be collected following the types and frequency listed in the OU3 QAPP (WHG, 2009) Worksheet #20: *Field Quality Control Summary Table*. Briefly, at one location, additional sample aliquots for matrix spike (MS) and matrix spike duplicate (MSD) will be collected for PCB congener analysis in surface water at a minimum frequency of 1 MS/MSD set for the Harbor Flux Study composite samples. At on location, an additional sample aliquot will also be collected for TSS and for Turbidity to provide the laboratory with a matrix duplicate (MD) QC sample. All samples for chemistry analyses are composites; therefore, no additional field duplicate samples have been defined for this project. No equipment blanks have been defined based on data quality objectives. See the OU3 QAPP (WHG, 2009) for further information on field and laboratory QC samples.

8.0 DOCUMENTATION PROCEDURES

The Chief Scientist is responsible for ensuring that all events occurring during the Harbor Flux Study are adequately documented. All field observations and data will be recorded in a Field Sampling logbook. The logbook will also contain documentation of navigation checks, a listing of sample IDs and a cross-reference to collection location and time.

If any deviations from the plan occur, the Woods Hole Group Task Manager, Robert Catalano will contact the project manager at USACE, Robert Leitch, prior to the occurrence.

8.1 SAMPLE IDENTIFICATION

Water samples selected for TSS, turbidity, and PCB analyses in support of this flux study will be identified as described below. All samples will be appropriately labeled (using indelible-ink) with the following information:

- Sample identifier
- Site name and location
- Collection location, depth, date and time
- Required analysis (i.e., TSS, turbidity, Total PCBs or Dissolved PCBs)
- Sampler's initials

Sample IDs will use the following protocol, which is consistent with prior New Bedford Harbor sampling events and with data in the New Bedford Harbor Superfund database:

Matrix	**Code**
Water	SW-PPP-XXXX-top depth-bottom depth

Where:

SW	= Surface Water prefix
PPP	= Sampling Year and Phase (2 digit year + 1 alpha character)
XXXX	= Water Station and sample number identifier (4 digits)
Top depth	= numeric top depth of sample (in feet to the 0.1 decimal)
Bottom depth	= numeric bottom depth of sample

QC samples: The PCB Matrix Spike sample has the suffix "MS", the PCB Matrix Spike Duplicate sample has the suffix "MSD" and the Matrix Duplicate samples for TSS and Turbidity have the suffix "MD".

8.2 DOCUMENTATION OF SAMPLE LOCATIONS

Navigation will be performed using a Trimble AGGPS 132 GPS system or equivalent with the HYPACK survey software for positioning. This system has sub-meter accuracy. The number of satellites and Horizontal Dilution of Precision (HDOP) and Positional (3-D) Dilution of Precision (PDOP) levels[1] are monitored in HYPACK during the course of the day.

Target station coordinates will be entered into the HYPACK system prior to sampling, and actual sampling coordinates will be recorded on-site.

Navigation will be performed using a Differential Global Positioning System (DGPS).

8.3 COMMUNICATION AND DOCUMENTATION OF DEVIATIONS

The project QAPP and FSP define requirements for field activities. Any modifications or changes to the planned activities are deviations and must be approved by the Project Manager. If circumstances in the field require deviations from the QAPP or FSP the Project Manager must be contacted as soon as it is safe to do so. All deviations must be documented as such in the field Logbook and approved by Project Manager or Chief Scientist. The Log should indicate the date that the Project Manager was contacted from the field and any resulting verbal approval. The documentation should include a description of the deviation and the reason, an assessment of impact that the deviation has on the study design and data quality, and any corrective action implemented.

9.0 SCHEDULE

The time schedule for the tasks associated with the Flux Study is shown in Table 1.

[1] Dilution of Precision (DOP) is a measure of the effect of satellite geometry on GPS precision. This indicates the level of precision, which in turn depends on the proximity and angular separation of satellite signals. A low DOP value represents a better GPS positional precision due to wider angular separation of satellites used to calculate a position.

Boat-based ADCP sampling will occur on two discrete days. Weather permitting the boat-based water sampling will be done on six discrete days, but weather will dictate the schedule. Water sampling will not be done when small craft advisories are issued, or if it is impossible to obtain samples due to choppy seas.

10.0 SAFETY PROCEDURES

For further details on safety procedures, please refer to the Accident Prevention Plan (APP) (Woods Hole Group, 2009b – in progress). The Woods Hole Group Field Safety and Equipment Checklist provided in Attachment 3 outlines site-specific safety precautions for this project.

11.0 REFERENCES

EPA. 2006. Chapter 4: Selection and Characterization of Reference Conditions. In Lake and Reservoir Bioassessment and Biocriteria, Technical Guidance Document. Office of Wetlands, Oceans, and Watersheds (4503F), Office of Science and Technology (4304), Office of Water. U.S. Environmental Protection Agency, Washington, DC. Available Online at *http://www.epa.gov/owow/monitoring/tech/chap04.html*

USACE. 2009. Statement of Work for RI/FS Report Field Work, Operable Unit No. 3 (OU3), New Bedford Harbor Superfund Site, New Bedford, MA, 14 August 2009 (SOW)

Woods Hole Group. 2009a (in progress). Quality Assurance Project Plan for RI/FS Field Work, Operable Unit No. 3 (OU3), New Bedford Harbor Superfund Site, New Bedford, MA, expected completion October 2009.

Woods Hole Group. 2009b (in progress). Accident Prevention Plan. For Sampling Activities for the U.S. Army Corps of Engineers Environmental Monitoring, Sampling, and Analysis New Bedford Harbor Superfund Site New Bedford, MA. Prepared under Contract DACW33-03-D-0001 Task Order No 0010 for the U.S. Army Corps of Engineers New England District, Concord, MA.

Woods Hole Group. 2009c. Conceptual Site Model and Data Gaps Analysis for OU#3 New Bedford Harbor Superfund Site, prepared by WHG for the USACE-NED Contract No. W912WJ-09-D-0001 Task Order No. 0005, May 2009.

ATTACHMENT 1 STANDARD OPERATING PROCEDURE FOR COMPOSITE SURFACE WATER SAMPLING

This SOP describes methods used to sample surface water using a boat or sampling platform to obtain a composite surface water sample.

- Wear appropriate protective equipment (waders, goggles, long-arm gloves).
- Obtain a new or pre-cleaned container with screw top provided by the laboratory.
- Lower pump intake to the appropriate depth and let pump run to clear all tubing of any non-sample depth water.
- Unscrew the top of the sampling bottle and place it into the discharge stream to capture the specified volume.
- Obtain the sample by holding the open end toward the discharge stream to avoid contamination by the sampler.
- Replace the screw top once the bottle is full.
- Dump the sample into the clean compositing container
- Repeat above steps until a composite sample from all the depths or locations are obtained.
- Mechanically mix the composite sample and remove a sub-sample using the appropriate new, labeled, pre-cleaned container with screw top provided by the laboratory – specific for each chemical analysis (see Table 2 of the Harbor Flux FSP for details on sample containers and preservation)
- Transfer the sample into a cooler with ice.
- Sampling device and compositing basins should be decontaminated between stations as described in Section 7.3 of the Harbor Flux FSP

ATTACHMENT 2 DGPS CALIBRATION FORM

Project No. W912WJ-09-D-DOCN-0010	Date:		Recorder:		
DGPS (make/model/SN):		Coordinate System and Units:			
Morning dGPS Check					
Time of Check (local):			DGPS Estimate of Accuracy (PDOP):		
Benchmark or Reference Point ID:			Benchmark or Reference Point Established By:		
Established Latitude/Northing:			Established Longitude/Easting:		
Measured Latitude/Northing:			Measured Longitude/Easting:		
Instrument Measured Displacement (meters):					
Displacement Acceptable (< m): YES NO					
Afternoon dGPS Check					
Time of Check (local):			DGPS Estimate of Accuracy (PDOP):		
Benchmark or Reference Point ID:			Benchmark or Reference Point Established By:		
Established Latitude/Northing:			Established Longitude/Easting:		
Measured Latitude/Northing:			Measured Longitude/Easting:		
Instrument Measured Displacement (meters):					
Displacement Acceptable (< m): YES NO					
Field Activities / Comments / Observations:					

ATTACHMENT 3 FIELD SAFETY AND EQUIPMENT CHECKLIST

Draft Field Sampling Plan **Date: May 2009**

New Bedford Harbor-Sediment Sampling

Field Safety and Equipment Checklist

FIELD SAFETY AND EQUIPMENT CHECKLIST

FIELD SAFETY CHECKLIST

Date of Survey_____

Project No. W912WJ-09-D-DOCN-0010

Type of work:

Sample collecting	
Landbased	☐
Waterbased	■
Mooring operations	☐
Dive operations	☐
Towed sampling	☐
Navigation	☐
Other:_____	☐

Type of sample collected:

Water	☐
Sediment	■
Sludge	☐
Raw sewerage	☐
Dredge materials	☐
Living organisms	☐
Marine debris	☐
Electronic data	■
Other:_____	☐

	Y	N
*Do samples impose a health risk?	☐	☐
If yes, what kind of hazard:		
Chemical	☐	☐
Biological	☐	☐
Radioactive	☐	☐
Other _____	☐	☐
Specify Hazard:_____		
* (or fixatives / additives used w/ samples)		
Is there a spill response plan?	☐	☐
Is one necessary?	☐	☐
Are immunizations necessary?	☐	☐
Will electrical equipment be used by staff?	☐	☐
Will electrical equipment be used on deck?	☐	☐
Will ground fault interrupt (GFI) be used?	☐	☐
Will electrical equipment be checked-out before survey?	☐	☐

List type of sampling equipment to be used:

_____

Do all members of the survey party have appropriate field experience?	☐	☐
Is training necessary before the survey?	☐	☐
Will there be lifting of heavy objects?	☐	☐
Are all members of survey party familiar with safe lifting practices?	☐	☐

Reviewed and approved

Task Leader_____ Date_____

Chief Scientist_____ Date_____

Dept Manager_____ Date_____

FIELD SAFETY EQUIPMENT CHECKLIST

Check equipment needed for survey

	Tech Staff	Lab Staff
Hard Hats**		
Work Vests**		
Life Raft		
EPIRB		
First Aid Kit		
Cold Weather Suits		
Safety Glasses		
Nitrile Gloves		
Tyvek Suits		
Radiation Detector		
Respirators		
Air Hood		
Face Shields		
Lab Coats		
Eye Wash		
Flash Lights		
Spill Response Kit		

** Required for surveys using vessels

Survey Party, Woods Hole Group, Inc. Staff

_____ _____

_____ _____

_____ _____

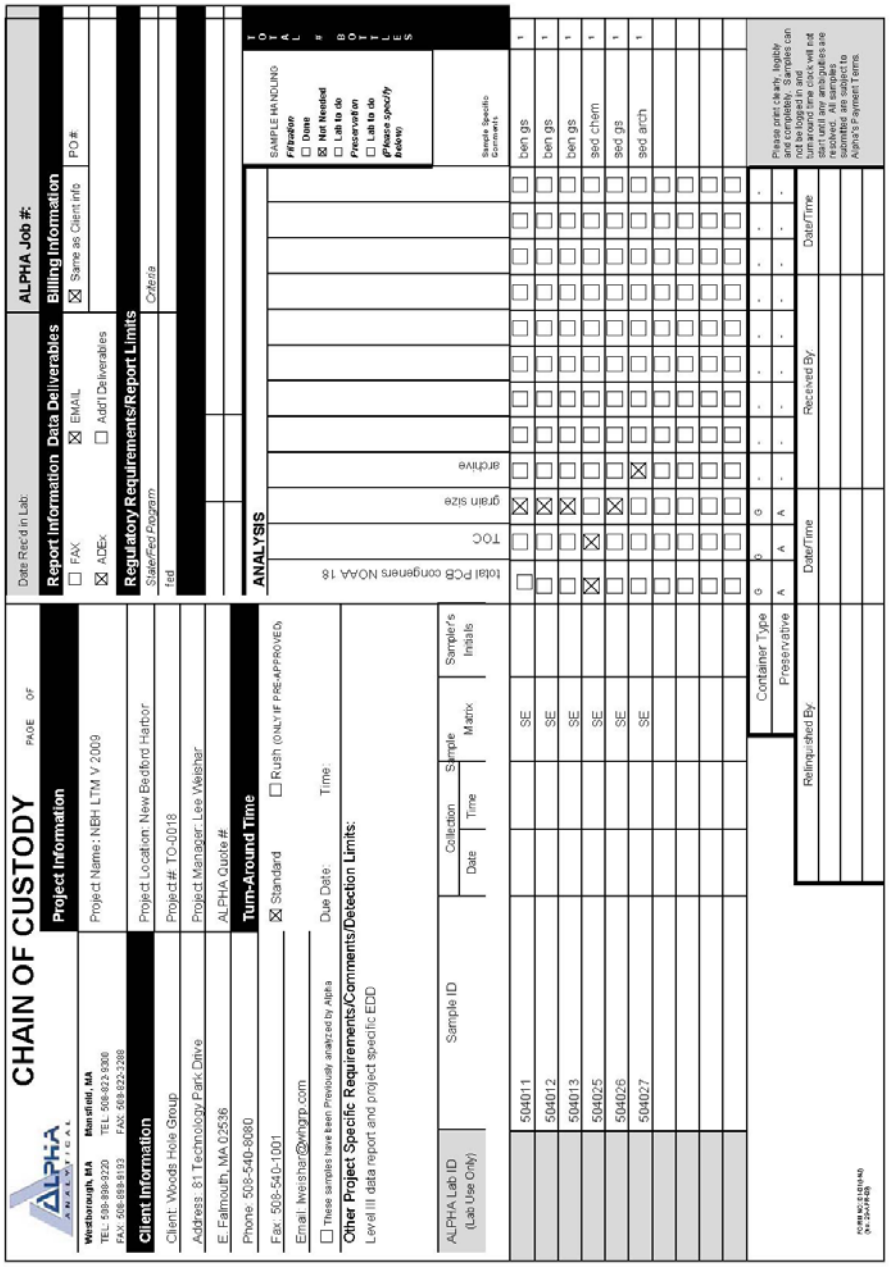
_____ _____

_____ _____

_____ _____

_____ _____

ATTACHMENT 4 EXAMPLE CHAIN OF CUSTODY



CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA TEL: 508-898-9220 FAX: 508-898-9193 — Mansfield, MA TEL: 508-822-9300 FAX: 508-822-3288

Project Information: Project Name: NEH LTM V 2009; Project Location: New Bedford Harbor; Project #: TO-0018; Project Manager: Lee Weisher; ALPHA Quote #:

Turn-Around Time: ☒ Standard ☐ Rush (ONLY IF PRE-APPROVED); Due Date: Time:

Client Information: Client: Woods Hole Group; Address: 81 Technology Park Drive; E. Falmouth, MA 02536; Phone: 508-540-8080; Fax: 508-540-1001; Email: lweisher@whgrp.com

☐ These samples have been Previously analyzed by Alpha

Other Project Specific Requirements/Comments/Detection Limits:
Level III data report and project specific EDD

Date Rec'd in Lab:

ALPHA Job #:

Report Information - Data Deliverables: ☐ FAX ☒ EMAIL ☒ ADEx ☐ Add'l Deliverables

Billing Information: ☒ Same as Client info; PO #:

Regulatory Requirements/Report Limits: State/Fed Program; Criteria; fed

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	ANALYSIS: total PCB congeners NOAA 18	TOC	grain size	archive	SAMPLE HANDLING: Filtration ☐ Done ☒ Not Needed ☐ Lab to do; Preservation ☐ Lab to do (Please specify below)	Sample Specific Comments	TOTAL # BOTTLES	
	504011			SE		☐	☒	☒	☐		ben gs	1	
	504012			SE		☐	☐	☒	☐		ben gs	1	
	504013			SE		☐	☒	☒	☐		ben gs	1	
	504025			SE		☒	☐	☐	☐		sed chem	1	
	504026			SE		☐	☐	☒	☐		sed gs	1	
	504027			SE		☐	☐	☐	☒		sed arch	1	

Container Type: g g — Preservative: A A

Relinquished By: Date/Time — Received By: Date/Time

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.

ATTACHMENT 5 STANDARD OPERATING PROCEDURE FOR ON-SITE FIELD WATER QUALITY MEASUREMENTS

In situ measurements of depth, turbidity, temperature, salinity, and dissolved oxygen will be acquired using an YSI 6920 water quality probe with real-time display and data logging.

Procedure

- Calibrate instrument as per manufacturer's instruction, or make sure instrument was calibrated within the past 24 hours.
- Record water depth in field log book or data sheets after measuring with a stadia rod in shallow water, or using the shipboard depth sounder in deep water.
- Turn YSI power on and switch mode to 'run'.
- Slowly lower the in situ sensor (~5sec/foot) through the water column with care taken to avoid placing the instruments on the bottom.
- Allow time for sensor to stabilize.
- Record sample depth (ft and tenths of a foot to 1 decimal), time (24-hr time), temperature (degrees Celsius), dissolved oxygen (mg/l).
- Raise sensor to next level in water column where next measurement is to be taken.
- Repeat steps 4-5.
- Place sensor in bucket, coil wires neatly, and turn power off.
- After sampling rinse the sensor thoroughly with deionized water.